AMSAT News Service Weekly Bulletins
Issue: ANS-331
Date: 2022-11-24
Sources: amsat-ans-2022-ans-331-weekly-hyperkitty-d33220f66b.txt

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AMSAT NEWS SERVICE
ANS-331

The AMSAT News Service bulletins are a free, weekly news and information service of AMSAT, The Radio Amateur Satellite Corporation. ANS publishes news related to Amateur Radio in Space including reports on the activities of a worldwide group of Amateur Radio operators who share an active interest in designing, building, launching and communicating through analog and digital Amateur Radio satellites.

The news feed on http://www.amsat.org publishes news of Amateur Radio in Space as soon as our volunteers can post it.

Please send any amateur satellite news or reports to: ans-editor [at] amsat.org.

You can sign up for free e-mail delivery of the AMSAT News Service Bulletins via the ANS List; to join this list see: https://mailman.amsat.org/postorius/lists/ans.amsat.org/

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ANS-331 AMSAT News Service Weekly Bulletins

To: All RADIO AMATEURS
From: Radio Amateur Satellite Corporation
712 H Street NE, Suite 1653
Washington, DC 20002

DATE 2022 Nov 27

Apogee View

The AMSAT 40th Space Symposium and Annual General Meeting has come and gone. All I can say is WOW! It was nice to finally meet in person again, and the Crowne Plaza AiRE in Bloomington, Minnesota, located right between the Minneapolis-St. Paul International Airport and Mall of America was the perfect venue.

Our Board of Directors met on Thursday, October 20th, and the first half of Friday, October 21st. It was a very informative and productive meeting. First, our engineering, operations, education, youth initiative, ANS, Journal, information technology, contest & awards, and web store teams provided updates on what they have been working on during the year, what they have accomplished, and what they are working on in the coming year. Then, as we moved to new business, our directors approved a new Reserve Policy and an Export Control and Economic Sanctions Policy, as well as discussed the use of the Fox Plus program as a test flight platform to quickly test newly developed satellite systems in space and the impact of the new FCC pronouncement on orbital debris mitigation.

On Friday afternoon and Saturday, we were treated to some fantastic presentations:

- Stefan Wagener, VE4SW, shared with us “Building a Portable Station for QO-100, the Geostationary

Satellite Es'hail-2 Carrying Amateur Radio.”

- Randy Berger, WA0D, ARISS Director of Engineering, provided us with an update on “What's New, ARISS on ISS and mission to the moon with Lunar Gateway."

- Next, Heimir Thor Sverrisson, W1ANT, presented an interesting proposal on “OTA Software Update for LEO satellites," using multiple ground stations to reprogram or apply software updates in coordinated segments.

- Nick Pugh, K5QXJ, then filled us in on the work being done at the University of Louisiana at Lafayette. Nick's first presentation covered the university's approach to its education initiative. The second presentation provided an update on their Cape IV mission.

- Paul Graveline, K1YUB, updated us on AMSAT’s CubeSat Simulator program.

- Kip Moravec, AE5IB, provided the current development status of AMSAT GOLF-TEE’s electrical power system.

- Burns Fisher, WB1FJ, shared improvements made to AMSAT’s Linear Transponder Module (LTM) power amplifier and the upcoming use of it in the University of Maine’s MESAT-1 3U CubeSat mission.

- Next up was a fascinating presentation by AMSAT’s Assistant V.P. of Engineering, Jonathan Brandenburg, KF5IDY, on his work, “Building a Helmholtz Cage for Dynamic Magnetic Field Generation and CubeSat Attitude Control Testing.”

- An update on AMSAT’s reaction wheel assembly open project update, was presented by Zach Metzinger, N0ZGO, and Jonathan Brandenburg, KF5IDY.

- The AMSAT 40th Space Symposium culminated with an AMSAT Engineering Update, provided by Jerry Buxton, N0JY, V.P. of Engineering.

You could tell our presenters put a lot of time and effort into preparing these, for which we are truly thankful.

New FCC Ruling Presents a New Set of Challenges

What goes up must come down, and that applies to satellites. Until now, all spacecraft had to either deorbit or move to a disposal orbit no later than 25 years after the end of their mission. With the Federal Communication Commission’s (FCC) new ruling, they must come down sooner.

The FCC’s new orbital debris mitigation ruling, FCC 22-74, requires non-geostationary satellite operators that terminate satellite operations in or passing through the low Earth orbit region (below 2,000-kilometer altitude) complete disposal as soon as practicable following the end of mission, and no later than five years after the end of its primary mission. The goal is to minimize the risk of collisions that would create debris.

The FCC defines “end of mission” to be "the time at which the individual spacecraft is no longer capable of conducting collision avoidance maneuvers," and, for spacecraft without collision avoidance capabilities, end of mission is defined as the point at which the individual spacecraft has completed its primary mission.

Furthermore, the FCC requires a demonstration that the probability of success of the chosen disposal method will be 90 percent or greater. This new rule-making will have a significant effect on AMSAT’s future satellite operations and, as such, was a serious topic of discussion at our recent board of directors meeting. That discussion generated many questions.

- What does the FCC mean by disposal demonstration, and what constitutes a 90 percent or greater probability rate?

- What are licensable disposal methods, other than through natural decay?

- Will the FCC accept the National Aeronautics and Space Administration (NASA) orbit analysis report for naturally decaying orbits to meet the probability threshold?

Unfortunately, the FCC did not supply much implementation guidance in meeting these new requirements, so our next step will be to reach out to the FCC to define our requirements better and how we can meet those standards. We will keep you informed.

Export Control and Economic Sanctions Policy

One of the most exciting things to come out of this year's AMSAT Symposium, at least to me, was our Export Control and Economic Sanctions Policy approved by our Board of Directors.

Some of AMSAT's greatest achievements have come from working with our international AMSAT partners. Unfortunately, changes in International Traffic in Arms Regulations(ITAR) and Export Administration Regulations (EAR) and the enforcement thereof caused a self-imposed limit to our international participation.

The desire to return to the international development of satellites and related systems served as the impetus for our new policy.

This policy states, "The Radio Amateur Satellite Corporation (AMSAT) will comply with all U.S. export control and economic sanctions laws and regulations." While this, in and of itself, is no different than how we have been operating, specific provisions of the policy create an essential path to our return to international cooperation through the use of the public domain (ITAR) and publicly available (EAR) exclusions.

It is important to note that ITAR and EAR exclusions only apply to information related to the development of our satellites but not to the actual building of satellites. Exporting materials to non-U.S. persons, be it hardware or software, will still require an export license. On the other hand, importing materials to the U.S. is not restricted by ITAR or EAR.

Creating this policy was only the first step. We still need to develop and put in place the prescribed controls to ensure our compliance and establish a training program for our volunteers, all of which we hope to have accomplished in the next couple of months.

I am excited about the opportunities that lie ahead with being able to collaborate with our fellow AMSAT organizations around the world once again.

Please read our new Export Control and Economic Sanctions Policy, available on our website, along with our other organizational documents, policies, and financial disclosures, at www.amsat.org/about-amsat/. This is your organization, and together, we can accomplish great things.

Until the next time, Onward & Upward!

[ANS thanks Robert Bankston, KE4AL, AMSAT President for the above information]

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- Education and CubeSat Simulator Project Update - Alan Johnston, KU2Y
- President's Club 2022 Members
- SatNOGS Ground Station at the School of Telematics - Omar Álvarez-Cárdenas, XE1AO, et al.
- Tips for Starting ISS Satellite Operations - Shavrika Pendyala, KQ4CUS
- A Helmholtz Cage: Developing a "Time Machine" - Jonathan Brandenburg, KF5IDY
- Expediting the Deorbit of CubeSats - Bob Stricklin, N5BRG
- AMSAT-NA 40th Annual Space Symposium and Annual Meeting Photos

Members can access the latest issue of The AMSAT Journal as well as archived editions (going back to 2014) on the membership portal. Not an AMSAT member yet? Join AMSAT today to start receiving your bi-monthly issue of The AMSAT Journal at https://launch.amsat.org/.

[ANS thanks AMSAT for the above information.]

SatPC32ISS Updated for Better GREENCUBE Performance

Erich Eichmann, DK1TB, has uploaded a revised SatPC32ISS.exe, which hopefully fixes the SatPC32ISS problems with GREENCUBE such as frequency drift etc. Also, the update now supports USB-D/LSB-D.

Erich says, "Simply copy the file into the SatPC32 program folder (usually C:\Program Files (x86)\SatPC32). Because of the different name, it will not overwrite your current SatPC32ISS. Start the program with the Windows Explorer. It will switch the radio into SPLIT mode (unless the radio is already in Satellite mode).
In menu CAT specify the CAT interval and save the change (the file does no longer share its CAT interval with the FM interval of the normal SatPC32 as it did previously). Don't set the interval too low!

"In Non-Satellite mode the radios (at least most as far as I know) go mute for the fraction of a second, when the frequencies are updated via CAT command. SatPC32ISS has to do that for Doppler correction. That can cause data losses, if packet data is received at that time. The pre-set 50 Hz interval seems to be a good value.

"The new file supports also FM-D. The entry in Doppler.SQF has to be FMD, the entries for USB-D an LSB-D) have to be USB-D and LSB-D.

If everything works, I will upload new setup files."

The file can be downloaded at www.dk1tb.de/SatPC32ISS_2.exe, or as zip file at www.dk1tb.de/SatPC32ISS_2.zip.

[ANS thanks Erich Eichmann, DK1TB for the above information.]

FUNcube-1 (AO73) Now celebrating nine years in orbit!

Another year has passed and FUNcube 1 has continued to operate from its orbit around 600km above the earth. To start with some statistics. The spacecraft creates and downlinks data in frames that run for two minute periods. It has now transmitted more that 16 million of these frames or “Sequence Numbers”. Another big statistic is that more than 10 million data packets have been received by stations that have forwarded them to FUNcube Data Warehouse.

You can see the leading ground stations at http://warehouse.funcube.org.uk/ui/fc1-fm/satellite_ranking – special congratulations to those at the top scorers…many of them have individually forwarded more than 1 million packets. Thanks to all contributors around the world. Having this network of ground stations has enabled the FUNcube team to easily monitor the status of the spacecraft easily.

Back here on earth, as mentioned, AMSAT-UK has continued to monitor the health of the spacecraft as these illumination levels and spin/tumble rates have changed over the months.

After some time in full sun, the spacecraft is now experiencing “normal” eclipse periods of around 25 minutes each orbit. This will reduce the on board temperatures and may influence the tumble rate which

has been between 2 and 5 seconds for some time. This is quite fast and is not helping telemetry reception with its 5 second data frame mentioned above.

The present operational schedule is for high power telemetry when in sunlight and receive only when in eclipse. This seems to suit the EPS quite well and the battery bus voltages have been quite stable.

At least that was correct until early morning on Friday November 11 when the indicated bus voltage appeared to “drop off a cliff” over the period of just four orbits. Further analysis showed that the 3.3V bus consumption had suddenly jumped four times normal. As can be seen by the graph above this problem then disappeared just as suddenly and the bus voltage recovered quite quickly. Investigations are continuing!

Please keep the telemetry reports coming in and let the FUNcube team know if you would like a Fitter message uploaded for any educational or outreach events.

[ANS thanks AMSAT-UK for the above information.]

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towards Keeping Amateur Radio in Space
https://www.zazzle.com/amsat_gear

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+ Completed Contacts
All-Russian Youth Space Festival "Vostochny Cosmofest", Amur State University, Blagoveshchensk, Russia, direct via RK0J.
The ISS callsign was RS0ISS.
The crewmember was Dimitri Petelin.
Contact was successful on Friday November 18, 2022 at 11:32 UTC.

Ural State University of Railway Engineering, Yekaterinburg, Russia, direct via RK9C.
The ISS callsign was RS0ISS.
The crewmember was Sergey Prokopyev.
Contact was successful Monday, November 21, 2022 at 15:20 UTC.

St. Joseph´s Convent Secondary School, Castries, St Lucia, multi-point telebridge via IK1SLD.
The ISS callsign was OR4ISS.
The crewmember was Josh Cassada, KI5CRH.
Contact was successful on Tuesday, November 22, 2022 at 17:40:36 UTC.

Five Bridges Junior High School, Stillwater Lake, NS, Canada, telebridge via IK1SLD.
The ISS callsign was OR4ISS.
The crewmember was Josh Cassada, KI5CRH.
Contact was successful on Wednesday, November 23, 2022 at 16:52:06 UTC.

The latest information on the operation mode can be found at
https://www.ariss.org/current-status-of-iss-stations.html

The latest list of frequencies in use can be found at https://www.ariss.org/contact-the-iss.html

[ANS thanks Charlie Sufana, AJ9N, one of the ARISS operation team mentors for the above information.]

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Satellite Shorts From All Over

+ The newly renovated west wing of the National Air and Space Museum at the downtown Mall recently opened to the public. The new "One World Connected" exhibit shows how aviation and spaceflight transformed how Earth came to be viewed and understood as an interconnected world. "One World Connected" tells the story of how taking to the skies and stars fostered two momentous changes in everyday life: the ease in making connections across vast distances and a new perspective of Earth as humanity's home. Featuring an array of satellites and other tools that have increased human connection, the exhibition asks visitors to consider how global interconnection touches their lives and to imagine how advances in technology might impact our near-future. Scale models of OSCAR 1 and MICROSAT are on display in the exhibit. Read more at:
https://www.si.edu/exhibitions/one-world-connected:event-exhib-6304.

[ANS thanks Perry Klein, W3PK, for the above information.]

+ Want to see the 2022 AMSAT Symposium Proceedings? No need to purchase them at the AMSAT Store if you're an AMSAT member! AMSAT members have free access to all Symposium proceedings going back to 1986. Simply log into the member portal at https://launch.amsat.org/ then click on the "Member Resources" tab. While you're there, download the 2022 Amateur Satellite Frequency Guide - also free to AMSAT members!

[ANS thanks AMSAT for the above information.]

+ NASA and the Government of Japan on Thursday announced further contributions by Japan to Gateway, a key component of the agency's Artemis missions for long-term lunar exploration. In addition to the Gateway arrangement, Minister Nagaoka announced Japan's commitment to participate in the International Space Station Program through 2030, the first international partner to join the United States in formally committing to space station operations through 2030. NASA welcomed Japan's announcement of its continuation of space station operations through 2030. NASA and its international partners conduct critical science, research, and technology demonstrations aboard the orbiting laboratory that make long-duration missions to the Gateway and the Moon possible. Read the full story at
https://tinyurl.com/ANS-331-JAXA.

[ANS thanks SpaceRef.com for the above information.]

+ During September 26 - 30 GNU Radio Conference 2022 was held in Washington DC. GNU Radio Conference (aka GRCon) is an annual conference centered around the GNU Radio Project and community, and is one of the premier software defined radio industry events. GNU Radio is an open source digital signals processing (DSP) tool which is used often with SDRs. A few days ago videos of all the presentations were released on their YouTube channels. The videos contain a mix of in person and remote talks. A schedule of all talks can be found on the GNU Radio website,
https://events.gnuradio.org/event/8/timetable/#20210920

[ANS thanks RTL-SDR.com for the above information.]

Join AMSAT today at https://launch.amsat.org/

In addition to regular membership, AMSAT offers membership to:

* Societies (a recognized group, clubs or organization).
* Primary and secondary school students are eligible for membership at one-half the standard yearly rate.
* Post-secondary school students enrolled in at least half time status shall be eligible for the student rate for a maximum of 6 post-secondary years in this status.
* Memberships are available for annual and lifetime terms.

Contact info [at] amsat.org for additional membership information.

73 and remember to help Keep Amateur Radio in Space!

This week's ANS Editor, Frank Karnauskas, N1UW
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